

**DIRECT TESTIMONY OF**

**HENRY E. DELK, JR.**

**ON BEHALF OF**

**SOUTH CAROLINA ELECTRIC & GAS COMPANY**

**DOCKET NO. 2018-2-E**

**Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND POSITION WITH SOUTH CAROLINA ELECTRIC & GAS COMPANY (“SCE&G” OR “COMPANY”).**

**A.** My name is Henry E. Delk, Jr., and my business address is 220 Operation Way, Cayce, South Carolina 29033. I am employed by SCE&G as General Manager, Fossil Hydro Operations.

**Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR BUSINESS EXPERIENCE.**

**A.** I graduated from Clemson University in 1993 with a Bachelor of Science degree in Mechanical Engineering and earned a Master of Business Administration from the University of South Carolina in 2000. I began my career with Milliken & Company in 1993 working as a Process Improvement Engineer. After three years, I accepted a position with Clariant Corporation as a Project Engineer. I began my career with SCE&G in 1997 in the Rate Department as a Rate & Regulatory

1 Specialist. In 2000, I transferred to Electric Transmission and assumed a position  
2 within the System Control department as a System Controller. Within Electric  
3 Transmission, I served as Supervisor/Manager of Operations Planning from 2001 to  
4 2007 and Manager of System Control from 2007 to 2012. I transferred to the  
5 Electric Operations division in 2012 to 2013 working as Manager of Northern  
6 Division Transmission Operations and Local Manager of the Lexington and Chapin  
7 Crew Quarters. From 2013 to 2014, I served as Director of Power Marketing. I  
8 assumed the role of General Manager, Fossil Hydro Technical Services in June  
9 2014. In September 2017, I assumed my current position as General Manager,  
10 Fossil Hydro Operations.  
11

12 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

13 A. The purpose of my testimony is to review the operating performance of  
14 SCE&G's Fossil Hydro units and South Carolina Generating Company's  
15 ("GENCO") Williams Electric Generating Station ("Williams Station") during the  
16 period January 1, 2017, through December 31, 2017 ("Review Period").  
17

18 **Q. PLEASE GIVE A SHORT DESCRIPTION OF SCE&G'S FOSSIL AND**  
19 **HYDROELECTRIC FACILITIES.**

20 A. SCE&G currently operates four (4) coal-fired steam units (1,704 megawatts  
21 ("MW")), three (3) gas-fired steam units (345 MW), eight (8) combined-cycle gas

1 turbine/steam generator units (gas/oil fired, 1,310 MW), sixteen (16) peaking  
2 turbines (348 MW), four (4) hydroelectric generating facilities (218 MW), and one  
3 (1) pumped storage facility (576 MW). From a renewable energy standpoint,  
4 SCE&G owns an electric generator at a biomass cogeneration facility which  
5 produces an output of 85 MW using a mixture of wood products and coal as its fuel  
6 source. The total net non-nuclear summer generating capability rating of these  
7 facilities is 4,586 MW. The ratings stated in this testimony are updated on an annual  
8 basis.

9  
10 **Q. DOES SCE&G OPERATE ADDITIONAL RENEWABLE GENERATORS?**

11 A. Yes. In addition to the biomass cogeneration facility described previously,  
12 SCE&G also owns and operates a thin laminate solar generation system on ten acres  
13 of rooftop at Boeing's North Charleston production facility. At peak capacity, this  
14 system generates 2.6 MW (DC nameplate).

15  
16 **Q. ARE THERE ANY PLANNED CHANGES TO THE MAKEUP OF SCE&G'S**  
17 **FOSSIL HYDRO GENERATION FLEET?**

18 A. Yes. On December 20, 2017, SCE&G and Columbia Energy, LLC  
19 ("Columbia Energy") entered into an Asset Purchase Agreement whereby Columbia  
20 Energy agreed to sell, and SCE&G agreed to purchase, the approximately 540 MW  
21 rated combined cycle gas-fired generation facility and equipment located near

1 Gaston, South Carolina. On January 16, 2018, SCE&G and Columbia Energy  
2 jointly petitioned the Commission to transfer the Certificate of Environmental  
3 Compatibility and Public Convenience and Necessity from Columbia Energy to  
4 SCE&G.

5 Also, SCE&G presently purchases shaft horsepower from KapStone  
6 Charleston Kraft LLC ("KapStone") to operate SCE&G's biomass generator (85  
7 MW) located at the KapStone facility in North Charleston, South Carolina.  
8 However, both the agreement by which SCE&G purchases shaft horsepower from  
9 Kapstone and the electric service agreement by which SCE&G provides electric  
10 service to KapStone expire on December 31, 2018; and KapStone intends to be its  
11 own primary supplier of electric energy at its North Charleston facility and have  
12 SCE&G serve as a secondary backup supplier of such energy. SCE&G therefore  
13 currently plans to sell its biomass generator to KapStone, effective January 1, 2019.  
14

15 **Q. PLEASE DESCRIBE GENCO AND ITS RELATIONSHIP TO SCE&G.**

16 A. GENCO owns Williams Station and was incorporated on October 1, 1984,  
17 as a SCANA subsidiary. GENCO sells to SCE&G the total capacity and entire  
18 output from the Williams Station under a Unit Power Sales Agreement approved by  
19 the Federal Energy Regulatory Commission. For purposes of this testimony, I  
20 include Williams Station when I refer to SCE&G's coal-fired steam plants.  
21

1 **Q. HOW MUCH ELECTRICITY WAS GENERATED BY SCE&G IN THE**  
2 **REVIEW PERIOD?**

3 A. In the Review Period, SCE&G generated 22,404,624 megawatt hours  
4 (“MWH”) of energy. Of this energy, the coal-fired steam units generated  
5 approximately 38%, the combined-cycle units generated approximately 34%, the  
6 nuclear plant generated approximately 21%, the gas-fired steam units (Urquhart  
7 Unit No. 3 and McMeekin Unit Nos. 1 & 2) generated approximately 3%, the  
8 peaking gas turbines and hydro units generated approximately 3%, and the biomass  
9 cogeneration facility and the solar generation facility together generated  
10 approximately 1%. Exhibit No. \_\_\_\_ (HED-1) provides a graphic display of how the  
11 Company’s generation met our customers’ demand for energy during this Review  
12 Period.

13  
14 **Q. PLEASE SUMMARIZE THE PERFORMANCE OF THE FOSSIL HYDRO**  
15 **UNITS.**

16 A. SCE&G’s Fossil Hydro units operated efficiently and dependably during the  
17 Review Period. SCE&G’s fossil units (including combined-cycle units) had an  
18 availability factor of 83.41%.

19 During the Review Period, SCE&G’s fossil units (including combined-cycle  
20 units) had a forced outage factor of 0.65%. The “forced outage factor” is the

percentage of the total hours that generating units are forced out of service (for various reasons) compared with the number of hours in the period.

**Q. PLEASE DISCUSS THE SIGNIFICANT PROJECTS UNDERTAKEN DURING SCE&G'S MAINTENANCE OUTAGES FOR THE REVIEW PERIOD.**

A. As part of the Company's ongoing maintenance program, SCE&G undertook a number of significant projects during its maintenance outages in this Review Period. A brief description of major work is as follows:

➤ **Jasper Combined Cycle Gas Turbine No. 3** completed a planned outage during Spring 2017. The primary work completed during this outage included: a turbine hot gas path inspection, generator electrical inspection/testing, heat recovery steam generator repairs including penetration seal and expansion joint replacements, re-tubing of the fuel gas preheater, and refurbishment of boiler feed pump motors.

➤ **McMeekin No. 1** also conducted a planned outage during Spring 2017. The primary work completed during this outage included: a major inspection of the turbine/generator, replacement of the voltage regulator and flow accelerated corrosion and high energy pipe inspections. The outage was extended after inspection of the low pressure rotor required by a General Electric Technical Information Letter (TIL 1904) showed measurable

1           indications of cracking. As a result of these findings, the rotor, which is the  
2           original rotor installed when the unit was constructed in 1958, had to be  
3           repaired before the unit could be returned to service, thereby extending the  
4           planned outage by approximately eight (8) months.

5           ➤ **Urquhart No. 3** completed a planned outage during Fall 2017. The primary  
6           work included upgrading the turbine governor controls, replacement of  
7           generator protective relays and 4160 volt breakers, and a comprehensive  
8           boiler inspection.

9           ➤ **Wateree No. 1** completed a planned outage during Fall 2017. The primary  
10          work completed during this outage included: turbine and valve motor control  
11          center replacement, boiler inspection with replacement of nose arch tubes,  
12          replacement of bags in the baghouse and cleaning of the condenser.

13          ➤ **Fairfield Pumped Storage No. 5, 6, 7 and 8** completed a planned outage  
14          during Fall 2017. The primary work consisted of replacing motor control  
15          centers for each unit and replacement of the emergency motor control center.

16          ➤ **Jasper Combined Cycle Gas Turbine No. 2** completed a planned outage  
17          during Fall 2017. The primary work completed during this outage included:  
18          a turbine hot gas path inspection, generator electrical inspection/testing, heat  
19          recovery steam generator repairs including penetration seal and expansion  
20          joint replacements, re-tubing of the fuel gas preheater, and refurbishment of  
21          boiler feed pump motors.

➤ **Williams Station** conducted a planned outage during Fall 2017. The primary work completed during this outage included: replacement of the main cooling tower, replacement of the rotary car dumper, installation of a redundant limestone ball mill, replacement of reheat pendant tubes in the boiler, replacement of burner tube panels in the boiler, inspection of the turbine, and major repairs to the high pressure/intermediate pressure turbine shell. This outage started on September 3, 2017, and the unit returned to service on January 19, 2018, approximately seven (7) weeks later than planned due to site evacuations during Hurricane Irma and a winter ice storm, additional work identified during the repairs to the high pressure/intermediate pressure turbine shell, certain work requiring schedule updates to reflect more time to complete than originally estimated by the vendor, and certain issues during start-ups of the unit in early January requiring further repairs.

**Q. PLEASE DISCUSS ANY SIGNIFICANT FORCED OUTAGES FOR THE PERIOD UNDER REVIEW.**

A. SCE&G's Fossil Hydro Operations defines a significant forced outage as any forced outage in excess of seven (7) days. Fossil Hydro had no significant forced outages during the Review Period.



**Q. WHAT WAS SCE&G'S FOSSIL SYSTEM FORCED OUTAGE FACTOR FOR THE PERIOD UNDER REVIEW?**

A. For the Review Period, SCE&G's fossil units (including coal-fired and natural gas-fired steam units and combined-cycle units) experienced a system forced outage factor of 0.65%. SCE&G's forced outage factor of 1.84% for coal-fired units compared favorably to the North American Electric Reliability Council ("NERC") national five-year (2012-2016) average of 4.67% for forced outage factors on all coal-fired units. SCE&G's forced outage factor of 0.08% for its combined-cycle units was much lower than the NERC national five-year (2012-2016) average for combined-cycle units of 2.62%. SCE&G's gas-fired steam units forced outage factor of 0.60% for the Review Period was much better than the NERC national five-year (2012-2016) average of 5.32% for gas-fired steam units.

**Q. PLEASE DISCUSS THE AVAILABILITY OF SCE&G'S FOSSIL PLANTS DURING THE REVIEW PERIOD.**

A. Availability factor is a measure of the actual hours that the generation units are available (overall readiness to provide electricity) divided by the total hours in the Review Period. Availability is not affected by how the unit is dispatched or by the demand from the system when connected to the grid. However, it is impacted by the planned and unplanned shutdown hours. SCE&G's fossil plants (including coal-fired and gas-fired steam units as well as combined-cycle units) had an

1 availability factor of 83.41% during the Review Period. For comparison purposes,  
2 the NERC national five-year (2012-2016) average for availability from all coal-fired  
3 units was 84.76%, and SCE&G's availability for its coal-fired units for 2017 was  
4 79.95% primarily due to the planned Fall outage at Williams Station. SCE&G's  
5 combined-cycle availability factor of 92.23% was much higher than the NERC  
6 national five-year (2012-2016) average for combined-cycle units of 87.68%.  
7 SCE&G's gas-fired steam units' availability factor was 64.52% for the Review  
8 Period which was lower than the NERC national five-year (2012-2016) average of  
9 82.66% for gas-fired steam units due to the extended planned outage at McMeekin  
10 No. 1.

11  
12 **Q. PLEASE EXPLAIN "HEAT RATE" AND DESCRIBE THE HEAT RATE OF**  
13 **THE FOSSIL UNITS DURING THE REVIEW PERIOD.**

14 A. Heat rate is a way to measure the thermal efficiency of a power plant. It is  
15 the number of British Thermal Units ("Btu") of fuel required to generate one (1)  
16 kilowatt-hour ("kWh") of electricity. Simply put, the lower the heat rate, the more  
17 efficient the plant.

18 The coal-fired steam unit average system heat rate for the Review Period was  
19 10,016 Btu/kWh. Cope Station had the best heat rate on our system at 9,607  
20 Btu/kWh followed by Williams Station at 9,847 Btu/kWh. For comparison  
21 purposes, the most recent data published by Power Engineering magazine in

1           December 2016 indicates that the national five-year (2011-2015) average for heat  
2           rate for all coal-fired units is 10,450 Btu/kWh.

3

4   **Q.    DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

5   A.       Yes.

2017 Generation Output

